ITEM 85 FY97
04MS5
21 December 1995

PURCHASE DESCRIPTION

VHF/UHF SYNTHESIZED SIGNAL GENERATOR (0.5 to 1024 MHz)

GEBJC-E

1.0 GENERAL DESCRIPTION This procurement requires a solid-state, signal generator covering the frequency range of 0.5 to 1024 MHz; output level continuously adjustable from +13 to -127 dBm; CW operation, internal AM/FM and external AM/FM and Pulse modulation capabilities.

2.0 CLASSIFICATION The equipment shall meet the requirements of MIL-T-28800( ), Type III, Class 5, Style E, Color R for Navy shipboard, submarine, and shore applications with the following modifications and exceptions:

a. The Electromagnetic Interference requirements of MIL-T-28800( ) are limited to CE01, CE03 (150 kHz to 50 MHz narrowband and 600 kHz to 50 MHz wideband), CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (relaxed 20 dB; back panel search excluded), RE02 (14 kHz to 10 GHz), and RS03.

b. The warm-up time is extended to two hours.

3.0 OPERATIONAL REQUIREMENTS The equipment shall be capable of generating signals within the parameters and accuracies specified herein.

3.1 Frequency Characteristics (where F = RF output frequency; L = output level)

3.1.1 Range: At least 0.5 to 1024 MHz

3.1.2 Resolution: 1 Hz

3.1.3 Accuracy: Same as time base

3.1.4 Stability: (After 2 hour warmup)

3.1.4.1 Internal Standard: < 5 pp 10^8/h (at 25°C ±5°C after warmup)
3.1.4.2 External Standard: stability of external standard
3.1.4.2.1 Input Freq: Accepts either 5 or 10 MHz inputs
3.1.4.2.2 Level: > 0.5 vrms and < 2.0 vrms
3.1.4.3 Standard Output: 10 MHz into 50 Ω; level ≥ 0 dBm nominal; BNC female connector
3.1.4.4 Temperature: < 10 ppm (0 to 50°C)

3.1.5 Spectral Purity (Equal to or better than limits specified below)

3.1.5.1	Harmonics/Sub-Harmonics: < -27 dBc	[L < +7 dBm]
3.1.5.2	Non-harmonics/Spurious: < -100 dBc	[> ±15 kHz of F]
3.1.5.3	Power Line Spurious: < -40 dBc	[< ±15 kHz of F]

3.1.5.4	Phase Noise: (Measured in 1 Hz BW at 20 kHz offset from carrier)	
3.1.5.4.1	At least -130 dBc/Hz	
3.1.5.5	Residual FM: < 20 Hz rms	[50 Hz to 15 kHz bandwidth]
3.1.5.6	Residual AM: < -80 dBc	[50 Hz to 15 kHz bandwidth]

3.1.6 Sweep (Digital)

3.1.6.1 Range: 1 to 1024 MHz

3.1.6.2 Step Size: At least 1 kHz to 100 MHz or automatically selected based on sweep time and span

3.1.6.3 Step Rate: At least 1 step/40 ms to 1 step/s or selectable sweep time of .5 to 1000 seconds

3.2 Output Characteristics

3.2.1 Range: +13 to -127 dBm

3.2.2 Accuracy: (Indicated output level vs externally measured level) ±1 dB

3.2.3 Flatness: (Output variation measured at +10 dBm)
±1.0 dB (peak-peak variation ≤ 2 dB)

3.2.4 Display (digital): Output level selectable in units of either power (dBm) or volts into 50 Ω

3.2.4.1 Resolution: At least 0.1 dB

3.2.5 Output Impedance: 50 ohms nominal

3.2.6 Connector: Type-N female

3.2.6.1 VSWR < 1.5:1 for output levels ≤ -10 dBm

3.2.6.2 VSWR < 2.5:1 for output levels > -10 dBm

3.2.7 Reverse Power Protection:
Resettable RF circuit breaker capable of withstanding inputs up to 50 watts

3.3 Modulation Characteristics

3.3.1 Sources: 2 separate
Both synthesized from the reference, a precise integer with the same stability and accuracy.

3.3.1.1 Frequency Range/Waveform: 10 Hz to 100 kHz / sinewave
3.3.1.1.1 Resolution: At least 1 Hz
3.3.1.2 Level: Adjustable to at least 1V peak
3.3.1.3 Impedance: 600 Ω ±10%
3.3.1.4 Outputs: At least one source
3.3.1.5 Control: At least one source via front panel / second source via special functions
3.3.1.6 Distortion: < 0.5% at 1 Vrms for frequency < 15 kHz

3.3.2 Amplitude Modulation (AM) (where F = RF output frequency)

3.3.2.1 Internal AM
3.3.2.1.1 Rate (3 dB Bandwidth):
3.3.2.1.1.1 Variable 10 Hz to 5 kHz (0.5 MHz < F < 8 MHz)
3.3.2.1.1.2 Variable 10 Hz to 10 kHz (8 MHz < F < 128 MHz)
3.3.2.1.1.3 Variable 10 Hz to 100 kHz (F > 128 MHz)

3.3.2.1.2 Depth: 0 to 99% (levels ≤ 0 dBm)
3.3.2.1.2.1 Display / Resolution: Digital 0-99% with 1% resolution
3.3.2.1.2.2 Accuracy: ±7% (depth < 80%) (Measured vs indicated depth at 1 kHz)
3.3.2.1.3 Distortion: < 5% (50% depth @ 1 kHz rate)
3.3.2.1.4 Incidental FM: <200 Hz (30% depth @ 1 kHz rate)

3.3.2.2 External AM
3.3.2.2.1 Rate (3 dB Bandwidth):
3.3.2.2.1.1 Variable 10 Hz to 5 kHz (0.5 MHz < F < 8 MHz)
3.3.2.2.1.2 Variable 10 Hz to 10 kHz (8 MHz < F < 128 MHz)
3.3.2.2.1.3 Variable 10 Hz to 100 kHz (F > 128 MHz)
3.3.2.2.2 Depth: 0 to 99%
3.3.2.2.3 Distortion: < 5% (50% depth @ 1 kHz rate)
3.3.2.2.4 Sensitivity: 1 Vpeak (or 1 Vrms) into 600 Ω produces depth selected within ±10%.

3.3.3 Frequency Modulation (FM)

3.3.3.1 Internal FM
3.3.3.1.1 Rate: At least 10 Hz to 100 kHz
3.3.3.1.2 Deviation: (1 and 10 kHz rates)
3.3.3.1.2.1 At least 1 Hz to 1 kHz (1 MHz < F < 8 MHz)
3.3.3.1.2.2 At least 10 Hz to 10 kHz (8 MHz < F < 64 MHz)
3.3.3.1.2.3 At least 50 Hz to 100 kHz (64 MHz < F < 515 MHz)
3.3.3.1.2.4 At least 100 Hz to 1 MHz (F > 515 MHz)
3.3.3.1.3 Display/Resolution: Digital, at least 3 digits in kHz
3.3.3.1.4 Accuracy: ±5% + 10 Hz (Meas. vs indicated deviation at 1 kHz)
3.3.3.1.5 Distortion: < 5% (20 kHz dev @ 1 kHz rate)

3.3.3.1.6 Incidental AM: < 1% (100 kHz dev @ 1 kHz rate)

3.3.3.2 External FM (same as 3.3.3.1 Internal FM except as noted below)
3.3.3.2.1 Rate: At least dc to 100 kHz
3.3.3.2.2 Sensitivity: 1V peak (or 1 Vrms) into 600 Ω produces desired deviation within ±10%.
3.3.3.2.3 Input impedance: 600 ohms ±10%

3.3.4 External Pulse Modulation (for outputs above 10 MHz)

3.3.4.1 Rate (PRF): At least dc to1 MHz
3.3.4.2 Pulse Width (PW) (minimum): < 500 μs
3.3.4.3 ON/OFF Ratio: Greater than 80 dB
3.3.4.4 Rise/Fall Time: < 100 nanosecond

4.0 GENERAL REQUIREMENTS

4.1 Power: 115 Vac ±10% single phase, 50, 60 or 400 Hz, and 230 Vac ±10% single phase, 50 and 60 Hz, 400 VA maximum.

4.2 Lithium Batteries Per MIL-T-28800, lithium batteries are prohibited without prior authorization. Requests for approving the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.

4.3 Dimensions: The total volume shall not exceed 47,050 cm^3 (2893 in^3).

4.4 Weight: The overall weight of the unit shall be nominally less than 27.3 kg (60 lb).

4.5 Calibration Interval: The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.

4.6 Remote Operation: The unit will be capable of remote operation via IEEE-488( ) bus interface. It shall operate as a talker or listener such that all functions except the power on/off switch are controllable and shall have as a minimum the following subset of GPIB commands: AH1, SH1, T6, L4, SR1, RL1, DC1.